

What we claim is:

1. A stabilized power supply unit, comprising:

a voltage control circuit for outputting a voltage control signal in accord with the difference between an output feedback voltage associated with the output voltage of said power supply unit and a reference voltage;

an output circuit for outputting said output voltage under the control of said voltage control signal; and

a current limiting circuit for generating a current limiting signal when the output current of said output circuit exceeds a predetermined level, wherein

said current limiting circuit includes:

a first slow-response type current limiting circuit for generating a first current limiting signal; and

a quick-response type second current limiting circuit having a lower gain than that of said first current limiting circuit, for generating a second current limiting signal, and

said current limiting signal, consisting of said first and second current limiting signals, controls said voltage control signal so as to limit said output current approximately to said predetermined level.

2. The stabilized power supply unit according to claim 1, wherein

said output circuit has an output transistor connected between a power source and the output terminal of said power supply unit, said output transistor adapted to be controlled by said voltage control signal so as to output a constant output voltage.

3. The stabilized power supply unit according to claim 2, wherein each of said first and second current limiting circuits has a current detection transistor of the same type and same conduction type as said output transistor, each of said current detection transistors controlled by said voltage control signal to output a detection current proportional to said output current.

4. The stabilized power supply unit according to claim 3, wherein

said first current limiting circuit includes

a first current detection signal formation circuit for generating, in response to the detection current of said current detection transistor, a first current detection signal lagging behind said current detection current, and

a first current limiting signal generation transistor, impressed with said first current detection signal as a control signal, in such a way that said first current limiting circuit generates a first high-gain, slow-response type current limiting signal;

second current limiting circuit includes

a second current detection signal formation circuit capable of promptly generating a second current detection signal in response to the detection current of said current detection transistor, and

a series circuitry of a second current limiting signal generation transistor impressed with said second current detection signal as a control signal and a resistor,

in such a way that said second current limiting circuit generates a second low-gain, quick-response type current limiting signal.

5. The stabilized power supply unit according to claim 4, wherein

said first current detection signal formation circuit has a delay detection circuit including at least one resistor and a condenser, outputting the voltage across said condenser as said first current detection signal;

said second current detection signal formation circuit has a detection circuit including at least one resistor, outputting the voltage drop across said resistor as said second current detection signal.

6. The stabilized power supply unit according to claim 1, wherein

said voltage control circuit has a differential amplifier for amplifying the difference between said output feedback voltage and said reference voltage and outputting said voltage control signal in accord with said difference, and

said current limiting signal is coupled to said voltage control circuit to regulate the amplified output of said differential amplifier.

7. The stabilized power supply unit according to claim 1, wherein

said voltage control circuit has a differential amplifier for amplifying the difference between said output feedback voltage and said reference voltage and outputting said voltage control signal in accord with said difference, and

said current limiting signal is coupled to said voltage control circuit to regulate either one of said output feedback voltage and said reference voltage.

8. A stabilized power supply unit, comprising:

a voltage control circuit for outputting a voltage control signal in accord with the difference between an output feedback voltage associated with the output voltage of said power supply unit and a reference voltage;

an output circuit for outputting said output voltage under the control of said voltage control signal; and

a current limiting circuit for generating a current limiting signal when the output current of said output circuit exceeds a predetermined level, wherein

said current limiting circuit includes;

an output current detection circuit for detecting said output current to generate an output current detection signal;

a first slow-response type signal generation circuit for generating a first current limiting signal;

a second quick-response type signal generation circuit, having a lower gain than that of said first current limiting circuit, for generating a second current limiting signal; and

a selection circuit for selecting, upon receipt of a switching signal formed based on a startup signal, either one of said first and second signal generation circuits to be supplied with said output current detection signal, said selection circuit adapted to select said second signal generation circuit during a predetermined period subsequent to a startup of said power supply unit, and otherwise to select said first signal generation circuit, and wherein

said first and second current limiting signals constitute a current limiting signal to control said voltage control signal so as to limit said output current approximately to said predetermined level.

9. The stabilized power supply unit according to claim 8, wherein said output circuit has an output transistor connected between a power source and the output terminal of said power supply unit, said output transistor adapted to be controlled by said voltage control signal so as to output a constant output voltage.

10. The stabilized power supply unit according to claim 9, wherein  
said output current detection circuit has a current detection transistor of the same type and same conduction type as said output transistor, said current detection transistor controlled by said voltage control signal to output said output current detection signal proportional to said output current.

11. The stabilized power supply unit according to claim 10, wherein  
said first signal generation circuit includes  
a first current detection signal formation circuit for generating, in response to the detection current of said current detection transistor, a first current detection signal lagging behind said detection current, and

a first current limiting signal generation transistor, impressed with said first current detection signal as a control signal, in such a way that said first signal generation circuit generates a first high-

gain, slow-response type current limiting;

second current limiting circuit includes:

a second current detection signal formation circuit capable of promptly generating a second current detection signal in response to the detection current of said current detection transistor, and

a series circuitry of a second current limiting signal generation transistor impressed with said second current detection signal as a control signal and a resistor,

in such a way that said second signal generation circuit generates a second low-gain, quick-response type current limiting signal.

12. The stabilized power supply unit according to claim 11, wherein

said first current detection signal formation circuit has a delay detection circuit including at least one resistor and a condenser, outputting the voltage across said condenser as said first current detection signal;

said second current detection signal formation circuit has a detection circuit including at least one resistor, outputting the voltage drop across said resistor as said second current detection signal.

13. The stabilized power supply unit according to claim 8, wherein

said voltage control circuit has a differential amplifier for amplifying the difference between said output feedback voltage and said reference voltage and outputting said voltage control signal in accord with said difference, and

said current limiting signal is coupled to said voltage control circuit to regulate the amplified output of said differential amplifier.

14. The stabilized power supply unit according to claim 8, wherein

said voltage control circuit has a differential amplifier for amplifying the difference between said output feedback voltage and said reference voltage and outputting said voltage control signal in accord with said difference, and

said current limiting signal is coupled to said voltage control circuit to regulate either one of said output feedback voltage and said reference voltage.